

Long-tailed Macaques *Macaca fascicularis* (Simiiformes: Cercopithecidae) Coexistence with Settlements in the Nyaru Menteng Arboretum Area, Central Kalimantan

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Abstract

The Nyaru Menteng Arboretum area in Central Kalimantan serves as a habitat for approximately 200 Long-Tailed Macaques *Macaca fascicularis* within its 65.2-hectare area, as recorded in 2024. A lack of food causes presumed *M. fascicularis* to descend to settlements in search of food, resulting in losses for the people of Nyaru Menteng Arboretum which leads to coexistence. This study aims to identify the types of coexistences that occur between *M. fascicularis* and villagers. The method used to identify coexistences is a survey method. The survey results explain that the types of coexistences that occur range from stealing side dishes (25%), damaging ceilings (25%) and messing up the kitchen (50%). Human resistance in the form of repellent using slingshots 32%, wood 40%, nets 20% and air rifles 8%. The findings of this study can serve as a reference for managing future coexistences and inform decision-making for effective *M. fascicularis* management in the Menteng Arboretum Area, Central Kalimantan.

Keywords: Endangered, Indonesian Borneo, interaction, Long-Tailed Monkey, *Macaca fascicularis*.

Introduction

The Long-tailed Macaque *Macaca fascicularis*, classified as Endangered by the IUCN (Hansen *et al.*, 2022), is increasingly encroaching on residential areas in Central Kalimantan (Hasanah *et al.*, 2022). Research suggests that the growing population and limited food availability are driving these primates to seek alternative food sources in human settlements (Setiawan *et al.* 2023, 2024; Rahmawati *et al.* 2014). This has led to agonistic behaviors such as biting, raiding, and property damage. Locally known as "Bakei" these long-tailed, ash-hued primates are social, fruit-eating creatures that exhibit complex behaviors related to reproduction, territorial defense, and social interaction (Hasanah *et al.* 2022)."

According to the Indonesian Ministry of Forestry Regulation No. P. 48/Menhut-II/2008, human-wildlife coexistence arises from interactions between humans and wildlife, which can have adverse effects on both parties. Such coexistences can lead to negative attitudes towards wildlife, eroding appreciation and ultimately undermining conservation efforts (Santoso *et al.* 2019). *M. fascicularis* are adaptable and often encroach into residential areas when agricultural food sources are scarce. They may rummage through trash, disturb livestock, or even raid homes in search of food, resulting in humans perceiving them as pests to be eliminated or enemies (Fauziah *et al.* 2023).

The presence of *M. fascicularis* can lead to material losses and pose health, physical, and psychological risks to local residents. Research by Hambali *et al.* (2012) and Md-Zain *et al.* (2013)

suggests that the disturbing behavior of these animals can lead to traumatic experiences for humans. This study aims to investigate the types of coexistences that occur between humans and *M. fascicularis* through direct interviews and surveys with residents. The findings will serve as a reference for managing future coexistences and inform decision-making for effective *M. fascicularis* management in Menteng Arboretum Area, Central Kalimantan.

Methods

The study was conducted in October 2023 in Nyaru Menteng Arboretum Area, Tumbang Tahai Subdistrict, Palangka Raya City, Central Kalimantan (Fig. 1). The Nyaru Arboretum area is a forest area that contains flora and fauna species. The Nyaru Menteng Arboretum is a type of lowland tropical forest with swampy and peaty soil conditions. With an area of 65.2 ha The Nyaru Menteng Arboretum is a conservation area for the germ plasm of the swamp forest ecosystem in Central Kalimantan Province. The types of primates in Nyaru Menteng include the Bornean orangutan *Pongo pygmaeus* which is in the rehabilitation center and *M. fascicularis* which is in the forest area.

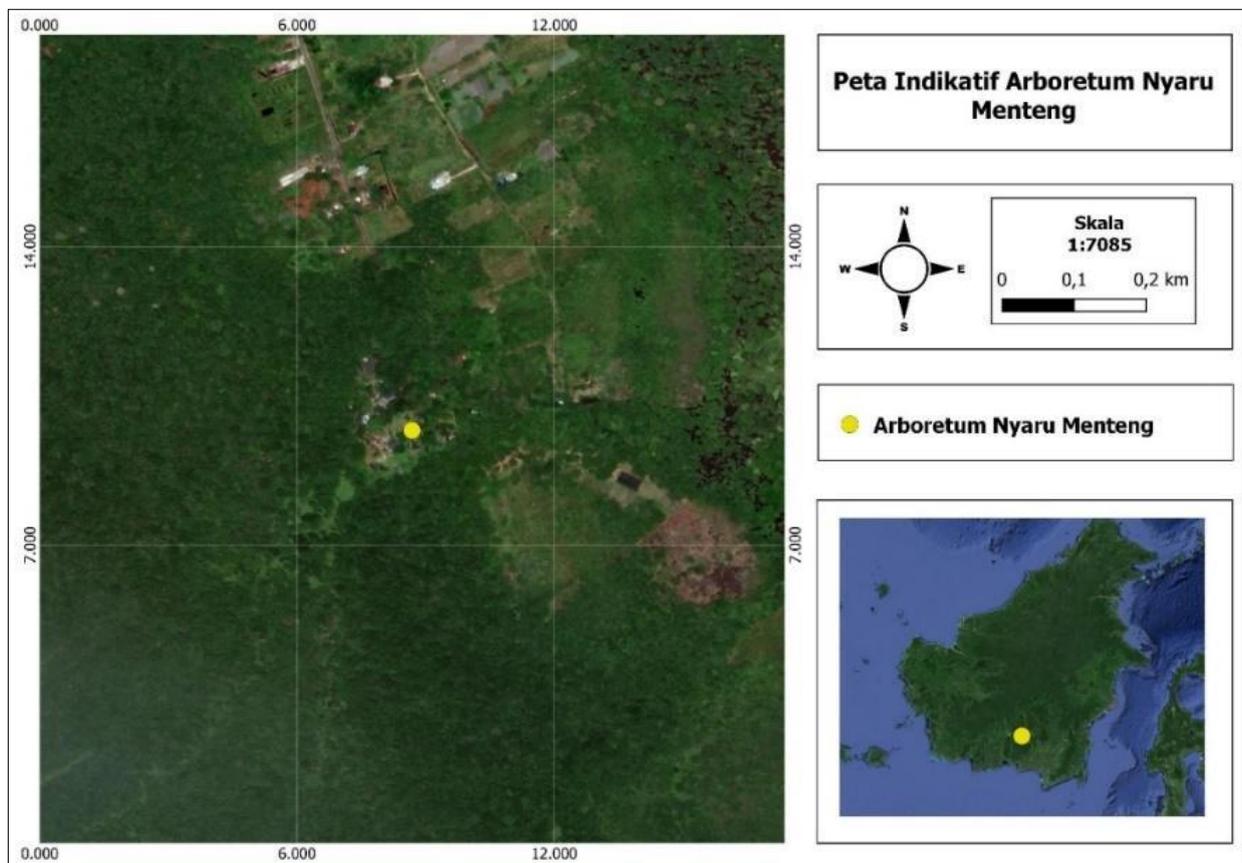


Figure 1. Map of Nyaru Menteng Arboretum, Palangka Raya City, Central Kalimantan (Nyaru Menteng Arboretum indicated by yellow circle).

Observation of the number of *M. fascicularis* groups was approached using direct observation techniques in the field. Locations marked by the presence of *M. fascicularis* in groups became areas/locations where *M. fascicularis* groups were located. The calculation of the number of groups was carried out considering that it was limited using the purposive sampling method. Population calculation to see how many populations there are around the settlement. Then, a social study was conducted on the local community. This social study is to explore community opinions regarding *M. fascicularis*, coexistences that occur, and community knowledge regarding *M. fascicularis*. The process in question is carried out using a questionnaire method, using a random sampling method of 20 people. The questionnaire was given to people aged 30-60 years old. Data from the interview results were analyzed descriptively by presenting the disturbances caused by of *M. fascicularis*.

Results and Discussion

Estimating the Population of *Macaca fascicularis*

The results of observations of *M. fascicularis* observed in the morning showed the number of individuals as many as 46 in one group. According to Southwick & Cadigan (1972) that the average number of individuals in one group is 27, then the population in Nyaru Menteng Arboretum is estimated to be 150. If we adhere to the opinion of Bercovitch and Huffman (1999) the average *M. fascicularis* group consists of 20-50 individuals, then the population assumption in Nyaru Menteng Arboretum area is between 150-200 individuals. *Macaca fascicularis* inhabits the arboretum area which intersects with the tourist area and plantations as well as the orangutan rehabilitation center.

Based on the results of interviews to residents, the *M. fascicularis* in the vicinity of Nyaru Menteng Arboretum area is around 200 individuals with four groups/colonies. This number is more or less by the estimate submitted by the neighborhood Association of Nyaru Menteng Arboretum area who stated that the *M. fascicularis* population in the village is around 200 individuals. The *M. fascicularis* colony forages for food in settlements by entering residents' kitchens and damaging facilities, thus causing losses to the community. Human and wildlife coexistence is a complex problem because it is not only related to human safety but also the safety of the animals themselves. The destruction of natural wildlife habitats is often also caused by human activities that use forests as agricultural land for economic interests. The clearing of forest land for development purposes in order to improve human living standards has caused the population (Santoso, 2019). In general, the main cause of human interaction is food motivation, so this species is known as a crop raider (Choong *et al.* 2021).

Conflict between Human and Monkeys in Settlement

Based on the survey results, data was obtained with 10 questions that on average the community already knows about primates (90%), questions about the differences between monkeys and apes were answered by 75% knowing and 25% not knowing, but 90% did not know the conservation status of *M. fascicularis* and 50% answered knowing that *M. fascicularis* is an endangered animal (Fig. 2). Some people know that *M. fascicularis* is a wild animal that must be protected, but its presence close to residential areas causes disturbances, so that residents are forced to avoid it.

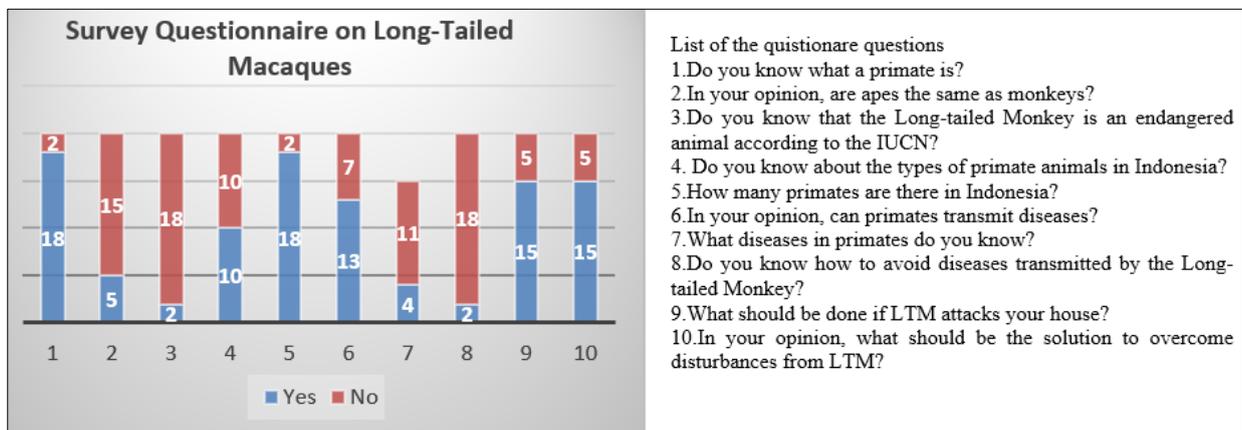


Figure 2. Public knowledge survey questionnaire on *Macaca fascicularis*.

Macaca fascicularis entering the settlement disturbs the community, the percentage of *M. fascicularis* disturbance according to 62% of respondents is very disturbing, while 13% feel only disturbed, but some say they are not disturbed by the presence of Long-tailed macaques because they are far from the arboretum area (Fig. 3). *Macaca fascicularis* enters the settlement during foraging time, around 14.00-18.00, starting with adult monkeys. The number of *M. fascicularis* entering is around 1-5 for one arrival. Saraswat *et al.* (2015) stated that the alpha male monkey will be the first to enter the settlement area if there is no threat, the alpha male will vocalize to call other adult monkeys.

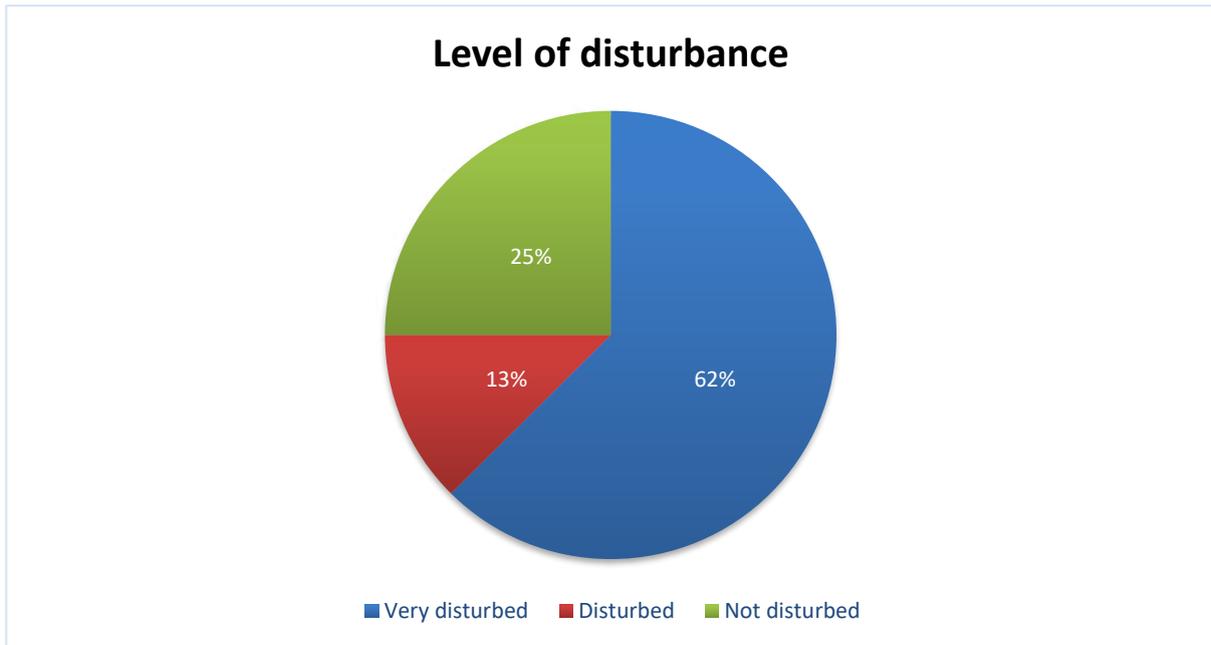


Figure 3. Disturbance level of *Macaca fascicularis* in the settlement.

Disturbances from *M. fascicularis* to settlements include damaging the ceiling (25%), stealing food (25%), and making a mess of the kitchen by 50% (Fig. 4). The disturbances that occur are caused by the urge to look for food outside the arboretum area. This disturbance is in line with Oriza's research (2019), that *M. fascicularis* are most often found in trees near houses, but there are several respondents who stated that long-tailed macaques climb the roofs of houses. According to residents of Nyaru Menteng Arboretum area, the *M. fascicularis* that first enters will go through the roof or from the back door by damaging the ceiling, and then look for food. The behavior of long-tailed macaques entering human areas is due to high levels of curiosity and the urge to look for new food owned by humans (Hambali *et al.* 2012). Long-tailed macaques will monitor the presence of humans first from a distance or from trees near settlements before entering the area and taking something they want (Kumar 2014).

The types of food taken by *M. fascicularis* are fish, eggs, chicken, and rice (Fig. 5). *Macaca fascicularis* will make a mess of the kitchen to steal the food. This is in line with the suggestion of Ganguly & Pradipika (2018) that macaques enter human areas to take food because macaques need nutrition to carry out their activities and survive. *Macaca fascicularis* attacks usually occur during the day and in the afternoon, because at that time there is a lot of human leftover food, and some reasons are because of the level of curiosity to revisit the place that the long-tailed macaques have encountered in the morning. Based on the results of the interview, it is known that these macaques often visit residents' homes almost every day. Monkeys will continue to return and remain around areas where human food is easily found (Mendis *et al.* 2016).



Figure 4 and 5. Disturbance levels of *Macaca fascicularis*.

According to Hambali *et al.* (2012), long-tailed macaques that gather in groups when they see humans will become aggressive and will attack humans because they feel threatened or disturbed. Based on the results of interviews with residents of Nyaru Menteng Arboretum area, the form of resistance carried out by humans was in the form of expulsion using air rifles as much as 8%, nets as much as 20%, slingshots as much as 32%, and wood as much as 40% (Fig 6). This was done by residents because they felt threatened when the *M. fascicularis* entered the house. When the *M. fascicularis* was expelled, they would run away to avoid humans, but if they came in groups, their behavior would turn against humans. According to Dipak & Sudipta (2015), the coexistence between humans and long-tailed macaques will cause hunting of the *M. fascicularis*, reducing the population of long-tailed macaques, and humans can be considered as predators for long-tailed macaques. As a result of this hunting, long-tailed macaques increase their vigilance towards humans to avoid reducing the population (Hambali *et al.* 2012).

Macaca fascicularis wanders into settlements are a threat to residents because *M. fascicularis* can transmit zoonotic diseases. Based on information from residents of Nyaru Menteng Arboretum area, residents already know that *M. fascicularis* can transmit diseases. out of 20 respondents, 13 people answered that they knew (65%), and 7 people answered that they did not know (35%). Diseases that can be transmitted zoonotic potential of *M. fascicularis*, such as tuberculosis, malaria, helminthiasis and HIV/Human Immunodeficiency Viruses (Purnaningsih *et al.* 2023). Residents at the research location have taken action to reduce the disturbance of *M. fascicularis*, such as building fences or simply expelling them, to provide a deterrent effect on long-tailed macaques so that they do not return because they are afraid that the presence of monkeys will affect the health of residents. Powell (2017) stated that if humans and monkeys often interact, it will increase the risk of humans being attacked by diseases carried by the monkeys because monkeys are one of the vectors of diseases that often attack humans, such as pneumonia, influenza, and various pathogenic bacteria.

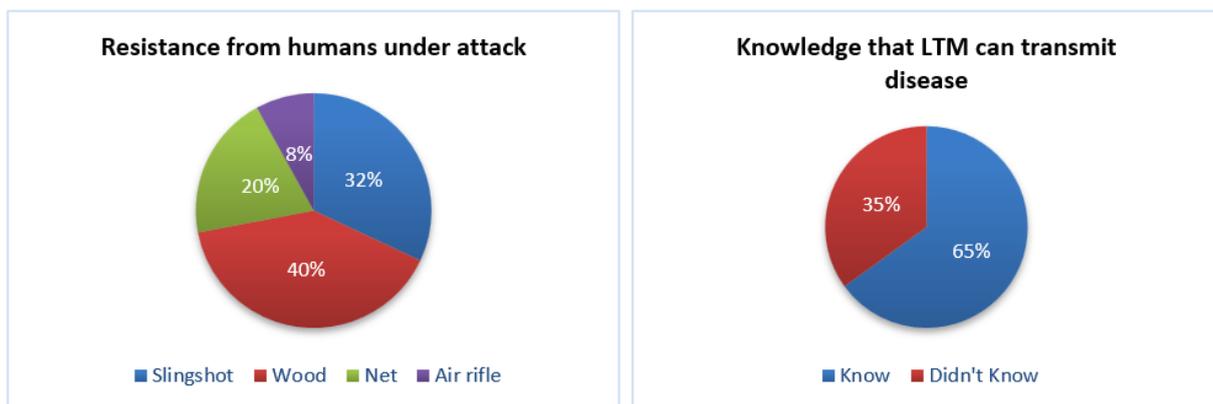


Figure 6 and 7. Disturbance level of *M. fascicularis*; and knowledge that *M. fascicularis* can transmit disease.

Residents urge the government to take a more proactive approach in addressing the population explosion of *M. fascicularis* in the Nyaru Menteng arboretum. They propose solutions such as relocating the *M. fascicularis* to a zoo or establishing a breeding facility. This suggestion aligns with Anju's (2015) recommendation that relocating coexistence-prone animals to zoos can enhance their survival rates. Although the government has made efforts to relocate the macaques to a larger forest area, a more effective strategy is still needed to mitigate coexistences between humans and *M. fascicularis* in Nyaru Menteng Arboretum area. Potential solutions include reforestation and expanding conservation areas to provide a habitat for the *M. fascicularis* that is separate from residential areas, thereby minimizing harm to both parties.

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